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FORESTS OF KUTHAR STATE

FOR THE

30 YEARS—1934 TO 1963.

BY

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Deputy Conservator of Forests

SIMLA.

1934.

WORKING SCHEME
FOR THE
FORESTS OF KUTHAR STATE
FOR THE
30 YEARS - 1934 TO 1963.

BY
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INTRODUCTION.

The working scheme was made as simple as possible, was approved by the Conservator of Forests, Eastern Circle, in his No. 1351 dated camp Bachhoi 27/30th January 1935, subject to a few alterations which were made.

The previous scheme (Mayes 1904) was written for a period of 20 years but actually operated for 30 years. The writers trust that this scheme may be equally successful.

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*Revised Working Scheme
for the
Demarcated Forests of Kuthar State.*

PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

*Chapter I.
THE TRACT DEALT WITH.*

1. **Name and situation.**—This revised Working Scheme deals with the demarcated forests of Kuthar State. The State is situated at a distance of 4 miles to the south-west of Subathu and 24 miles to the west of Simla. It occupies the crest and sides of a prominent ridge running northward from Kasauli towards the Sutlej. It is bounded on the north by Patiala; on the east by Patiala and the British pargana of Bharauli; on the south by Beja State and on the west by Mailog. It has an area of 20 square miles, of which 25 percent is cultivated, 33 per cent waste and grasslands, 36 per cent grazing grounds and 6 per cent forests. Most of the waste and much of the grazing grounds are well forested with trees or bushes, so that in reality the State is extremely well forested.

2. **Configuration of the ground.**—The country is mountainous ranging in elevation between 2300 and 5300 feet. The demarcated forests are found at elevation between 2400 and 4800 feet. The gradients are moderate to steep, rarely precipitous.

3. **Geology, rock and soil.**—The rocks chiefly consist of sandstone of a grey or purple colour with subordinate beds of clay belonging to the Sirmur series of the sub-Himalayan system. Limestone occurs in Bire-ki-dhar forest. The soil resulting from the decomposition of these rocks is a clayey loam which is light or heavy according to the predominance of one or the other component. On the crests, spurs and ridges and on exposed places; particularly on hot aspects the soil is dry, shallow and stony.

4. **Climate and rainfall.**—The climate resembles that of the lower hill districts of the North-eastern Punjab. The later half of April, May and June are usually hot and dry. Snow falls rarely and as a rule only on the central ridge. Early and late frosts are of rare occurrence. No rain gauge is maintained in the State. The average annual rainfall of the adjoining Bharauli ilaqqa for the last ten years is 40 inches. Most of the rain falls during the month of July, August and September and some of the springs and most of the nals dry up during the hot weather.

5. **Distribution and area.**—In pursuance of the policy of forest conservancy in Simla hills, McIntire proposed the demarcation of 10 forests in 1888. This was completed in 1893. An area of 529 acres was demarcated and a boundary register compiled. Later on, in 1904, while preparing the working plan of these forests, Mayes found that the original demarcation was faulty; pillars had fallen into disrepair; and the boundary register was vague and unreliable. Consequently the demarcation was revised and corrected. Two more forests, *viz* Shamme-ki-dhar and Pambu-ki-dhar of a total area of 59 acres were added, resulting in the formation of 12 forests with a total area of 588 acres. The following changes took place subsequently:—

(a) In 1908 on the decision of a boundary dispute by the Superintendent, Hill States, Simla, an area of 20 acres was alienated in favour of Patiala State from Chhanol forest.

(b) In 1929 the whole of Shamme-ki-dhar chir forest (area 32 acres) was disforested and given over to the durbar for founding a new hill station called Jagit Naggar, on condition that chir trees would be preserved for maintaining the beauty and health of the station (*vide* Superintendent, Hill States, Simla letter No. 3656, dated 27th September, 1929). So that there are now 11 demarcated forests as given in the following statement:—

Serial No.	Name of forest.	Area (acres)
1	Chhanol	38
2	Sbili	35
3	Boli Katli	60
4	Nalka	75
5	Majha	40
6	Tinuli-ka-Nal	33
7	Pambu-ki-dhar	27
8	Bagi-ki-dhar	112
9	Khadli	30
10	Dagota	29
11	Bire-ki-dhar	57
Total area		536 acres

6. State of boundaries and maps.

(i) *Boundaries.*—The boundaries of the forests are now on the whole well demarcated by dry rubble masonry pillars, measuring about 3 feet at the base and 2 feet at the top. They are serially numbered and are shown on the 2"=1 mile scale map prepared by Mayes in 1904.

(ii) The forests along with the State area were surveyed on a scale of 2"=1 mile by the Survey department between 1887-1891. The correct forest boundaries were not shown on the survey sheets, as the demarcation was incomplete at that time. The boundaries have now been marked on the survey sheets as accurately as possible and the position and number of every boundary pillar shown therein. The areas computed with a planimeter from these maps have been adopted for purposes of this scheme.

7. *Legal position.*—The superior and inferior ownership of all forests, waste land, grazing grounds, streams and nala is vested in the Chief, subject to the zamindars rights of user in forests, grazing grounds and waste lands. The management of the demarcated areas is controlled in accordance with the Punjab Government Notification No. 125 dated the 5th February, 1904.

8. *Rights and concessions.*—A record of rights was drawn up at the time of the first demarcation in 1893 and is still in force. Bagi-ki-dhar and Bire-ki-dhar which are classed as "Mahsuz" (protected) forests are free of rights. The remaining 9 forests are termed "Mahduda" (demarcated) and are burdened with the following rights of user:—

Timber for buildings; fuel for household use, for cremation and obsequies and for marriage ceremonials; wood and charcoal for agricultural implements; grazing; grass cutting and the removal of fallen chir needles for litter. An abstract of the record of rights is reproduced in Appendix II.

9. *Building timber.*—The species principally used for building purposes are as follows:—

Pinus longifolia (chir), *Anogeissus latifolia* (chhal), *Acaciacatechu* (khair), *Albizzia lebbek* (siris), *Albizzia odoratissima* (karmaru), *Eugenia Jambolana* (jaman) and *Terminalia bellerica* (bahera).

10. Procedure governing the grant of trees to right holders has varied from time to time in the past and the present system is that:—

- (a) trees from demarcated forests are granted only when none are available in dehat areas;
- (b) applications for trees are taken on annas 2 stamp paper, and sanction orders are passed by the ruling chief. Fees are realized in cash and the trees are marked by the Darogha;
- (c) no permits are issued, but record of kinds of trees granted and the amount realized are entered in a register maintained for the purpose.

11. The following statement shows the scale of fees charged from right holders.

Species	Rate per foot girth for girth classes				
	Upto 1' 6"	1' 7" to 2' 0"	to 3' 1" to 4' 0"	to 4' 7" to 6' 0"	to 6' 1" and over
Walnut and Shisham	Rs. A. P. 0 4 0	Rs. A. P. 0 8 0	Rs. A. P. 0 12 0	Rs. A. P. 1 0 0	Rs. A. P. 2 0 0
Siris, Karmaru, Kakkar, Khair and Kikar	0 2 0	0 4 0	0 8 0	0 12 0	1 8 0
Jaman, Chhal, Shingar, chir, mango and sain.	0 1 0	0 2 0	0 4 0	0 8 0	0 12 0
Bahera, khitak and other miscellaneous species	0 0 6	0 1 0	0 2 0	0 4 0	0 8 0

Bamboos at anna 1 to annas 4 each according to length.

12. The following statement shows the number of trees and bamboos used by the State, right-holders and free grantees from demarcated forests for building purposes during the period 1904 to 1932:—

Consumer.	Species.		
	Chir	Hardwood.	Bamboos.
State	...	517	203
Right-holders	...	4036	2803
Free grantees	...	548	559
			...

3961 hardwood trees were also granted for conversion into charcoal for the manufacture and repair of agricultural implements. Records by classes are not available but the figures given above show that the average annual consumption is chir trees 178, hardwood trees 123 and bamboos 220.

13. Grazing.—Right of grazing is exercised in all forests except Bagi-ki-dhar and Bire-ki-dhar. The following statement shows the number of animals owned by right-holders, as recorded in the 1931 census:—

Cattle	... 4330	Sheep and goats	... 2364
Buffaloes	... 1514	Ponies, mules and donkeys	... 27

These figures spread over the entire waste and forest land in the State give an incidence of 0.9 animal per acre, but a proportion of the stock is stall fed.

In addition to local sheep and goats, the State at present admits nearly 4,000 gaddis sheep and goats in the dehat areas on payment of annas 2 fee per head for the four winter months from November to February.

14. **Grass cutting.**—In areas free of rights of use, grass is cut and collected for States use; If in excess it is leased out to local zamindars for a small consideration.

Chapter II. THE FOREST.

15. **Composition and condition of the crop.**—A detailed description of individual forests is given in Appendix I, but broadly speaking the forests are of two distinct types, viz (a) chir forests and (b) mixed hardwood forests. Bamboos occur mixed with hardwood species only in Bire-ki-dhar forest.

(a) *Chir forests.*—There are 5 almost pure chir forests, viz Chhanol, Shili, Boli Kathi, Nalka and Majha having a total area of 248 acres. They occur on almost all aspects in the higher southern and eastern portions of the state between 2,900 and 4,800 feet elevation. The crop consists mainly of poles to II class trees, III class trees predominating. The density and quality of the crop varies with aspect and soil. On hot slopes where the soil is shallow and stony, the development of chir is poor, and the crop generally open. On sheltered slopes stocking is better, consisting of canopied crops; generally speaking the quality of chir throughout these forests is very low. Reproduction is on the whole scanty, except in the lower half of Nalka forest, where due to its closure to grazing and browsing since 1904, dense patches of young poles and saplings have established themselves under an open over-wood of I and II class trees. *Carissa spinarum*, *Pyrus pashia* and *Myrsine africana* form the undergrowth. *Euphorbia royleana* is found in almost all the forests generally on hot slopes, while *Lantana* is found in the lower half of Majha, Nalka, and Chhanol. Some *Pistacia integerrima*, *Debregeasia hypoleuca*, *Cedrela toona* and *Albizia odoratissima* are found growing in depressions. These forests are of little economic value, but are of great importance for general protection and for meeting the requirements of the State and the local populace.

(b) *Mixed hardwood forests.*—Timli-ka-nal, Pambu-ki-dhar, Bagi-ki-dhar Khadli, Dagota and Bire-ki-dhar-area 288 acres. These forests generally occupy the southern and western slopes between 2,400' and 4700' altitude. They are composed mainly of brushwood and a great variety of broad-leaved trees usually found in the sub-mountain tracts. Their composition and density vary greatly with aspect and altitude. The trees do not grow to large dimensions, are branched and have low crowns. They are suitable only for small sized timber and firewood. They coppice well, but seeding reproduction is wanting. The growth of coppice in earlier years is sufficiently rapid.

The important species found in these areas are as follows:—

Trees.—*Anogeissus latifolia*, *Acacia catechu*, *Odina wodier*, *Albizia lebbek*, *Albizia odoratissima*, *Spondias mangifera*, *Cassia fistula*, *Limonia acidissima*, *Ehretia laevis*, *Kydia calycina*, *Ougeinia dalbergioides*, *Phyllanthus emblica*, *Pyrus pashia*, *Boehmeria rugolosa* and *Grewia oppostifolia*.

Shrubs.—*Mallotus philippinensis*, *Nyctanthes arbor-tristis*, *Carissa spinarum*, *Woodfordia floribunda*, *Flacourzia Ramontchi*, *Murraya koenigii*, *Adhatoda vasica* and *Indigofera pulchellum*.

Climbers.—*Bauhinia vahlii*, *Millettia auriculata*, *Pueraria tuberosa*, *Spatholobus roxburghii*, *Cuscuta reflexa* and *Acacia caesia*. *Euphorbia royleana* occurs on steep and rocky ground and *Lantana* is spreading mainly on hot steep blanks.

(c) *Bamboos*.—*Dendrocalamus strictus* is the only species and is confined mainly to Bire-ki-dhar forest. It occurs in intimate mixture with other broad leaved species. The clumps are mostly congested. Seedling reproduction exists to some extent but extension by culms is comparatively slow. Flowering is only sporadic and is confined to scattered clumps.

16. **Injuries to which the crop is liable.**—The chief causes of injury to which the forests are liable are:—

Drought.—The long summer drought causes heavy mortality amongst seedlings of all kinds. Its severity adversely affects the production and growth of coppice shoots. Whenever the rainfall is insufficient, the production of young bamboo shoots is considerably reduced.

Frost.—Early and late frost kills off a number of chir seedlings and bamboo and coppice shoots. Its severity varies directly with the dryness of the season, a rainless winter being always marked by the occurrence of heavy frosts.

Fires.—Fires are of rare occurrence. Even in 1921, when almost all the hills were affected, Kuthai State forests escaped the conflagration. During 1934 the undemarcated chir forests around Jagjit Naggar were partially burnt.

Climbers.—*Bauhinia vahlii* occurs almost frequently in some of the hard-wood forests. It often completely envelopes the trees and bamboo clumps and is a great menace to tree and bamboo growth.

Grazing.—Overgrazing and overbrowsing are undoubtedly responsible for the absence of natural reproduction in open parts of chir forests, in other forests grazing has done little harm to regeneration.

Grass cutting.—Grass cutting leads to the destruction of a large number of seedlings in chir forests as it is difficult to get the grass cutters to take the trouble to avoid the young plants which are consequently severed in large numbers.

Lantana.—*Lantana* is found in impenetrable masses in some of the hard-wood forests; in some of the older stands it appears to be breaking down as it is being replaced gradually by other species.

Animals.—Porcupines do considerable damage to bamboo shoots. Monkeys uproot chir seedlings and eat the bark off the roots.

Chapter III

UTILIZATION OF THE PRODUCE.

17. **Agricultural customs and wants of the population.**—The population of the State is almost entirely agricultural. According to the census figures of 1931, authenticated by the State, there is a total population of 3760 people giving a density of 188 persons per square mile. Their chief requirements are timber, fuel, charcoal, fallen chir needles for litter and manure, grazing and grass cutting. Cattle are kept in large numbers for sale of milk in Subathu and Kasauli cantonments. Grass is also sold at these places, although most of it comes from grasslands outside the demarcated forests.

18. **Markets and marketable produce.**—The chief marketable products are chir timber, firewood, charcoal and grass, all of which are readily saleable at Kasauli and Sabathu. When sold bamboos are marketted at Kalka. Timber demand is for sawn planks and scantlings. Thin wood and round poles are disposed of as firewood. A small demand for chir timber also exists locally in Jagjit Naggar town. The State also uses chir trees for repairs to its buildings. There are no other local trades or industries which use timber in any quantity and the zamindar as a forest right holder can obtain all needs at concession rates. Refuse is removed by villagers for firewood from all forests.

19. **Lines of export.**—The existing mule road from Khadli to Sabathu through Kulhar Durbar, the kacha motor road from Jagjit Naggar to Garkhal, and the village paths all over the tehsil, form an excellent system of communications.

20. **Methods of exploitation.**—Coppice areas and trees marked for export are sold standing to purchasers.

Chapter IV. STAFF AND LABOUR SUPPLY.

21. **Staff.**—The present establishment is as follows :—

1 Forest darogha at Rs. 30 per mensem.

3 Forest guards at Rs. 7 per mensem each.

The beats are distributed as follows : -

Beats.	Forests.
Nali Ghar Rihani-ki-dhar	Chhanol, Boli Katli, Shili, Nalka and Majha. Timli-ki-nal, Pambu-ki-dhar and Bagi-ki-dhar and Khadli. Dagota and Bire-ki-dhar.

The forester has had practical training in Bashahr and Kangra and understands thinnings and other markings. All the forest guards are illiterate.

22. **Labour supply.**—For minor forest works, local labour is readily available at annas 4 to annas 6 per diem.

Chapter V. PAST SYSTEM OF MANAGEMENT.

23. **Past History.**—The early history of these forests is unknown, but it appears that prior to 1888 when forest conservancy was first attempted in the Simla Hills, the villagers removed any forest produce they wanted and wherever it suited them best. Five forests, viz., Bagi-ki-dhar, Bire-ki-dhar, Khadli, Dagota and Nalka were, however preserved for the state use and fellings were prohibited therein except with the permission of the Rana. Demand for chir timber was limited, but that for firewood and charcoal increased steadily in the neighbouring cantonments of Sabathu and Kasauli, with the result that some of the kokat forests

were clear felled, converted into fuel and charcoal and exported to the cantonments for sale. Nomadic flocks of sheep and goats were admitted freely during the cold weather months, partly for realising grazing dues, but largely for manuring the agricultural fields.

24. **Past system of management.**—The first working plan was introduced in 1904 and was operative for 20 years. The principal objects of the plan were to improve the condition of chir forests, to provide for the realization of a sustained annual yield of fuel and to satisfy the legitimate requirements of the right holders.

Two working circles were formed :—

(a) *Chir Working Circle.*—Comprising of Chihanol, Shili, Shamme-ki-dhar, Boli katli, Nalka and Majha having a total area of 300 acres.

(b) *Scrub Working Circle.*—Comprising of Timli-ki-nal, Pambu-ki-dhar, Bagi-ki-dhar, Khadli, Dagota and Bire-ki-dhar having a total area of 288 acres.

In the Chir Working Circle, the forests being immature were treated under thinnings and improvement fellings on a 5 year cycle. The yield of these fellings was utilized in meeting the needs of local people, but any balance left over could be sold for export.

In the Scrub Circle, the system prescribed was coppice with standards on a rotation of 20 years, providing the retention of 30 standards per acre. The annual coupe was fixed at 14.5 acres. Grazing was excluded from the coppice coupes after fellings, for a period of 10 years and the grass cutting for the first 5 years. In the case of Khadli forest, however, in order to meet the recurring demand of the bazar people for building timber, all the large trees were retained and only brushwood cut for firewood. These fellings resulted in sufficient coppice regeneration.

For the treatment of bamboo areas in Bire-ki-dhar forest two blocks of 20 acres and 37 acres were formed. The cutting of two year old culms in alternate years was prescribed and at least 10 green shoots 4" to 8" apart were to be retained in each clump. Thor and climbers were to be cut over the whole area. The prescriptions of the plan were on the whole carried out although at times for want of purchasers, the selling of coppice areas and the cutting of bamboo was not carried out, regularly in conformity with the felling programme. Resin tapping was started sometime in 1920, but as it did not prove a financial success, it was given up in 1924.

On the expiry of the plan in 1924 and until now the working of the forests has been controlled by Annual Plans of Operations drawn up by the Divisional Forest Officer, Simla, and sanctioned by the Superintendent, Hill States. As a result of past treatment, the chir forests have undoubtedly improved. The area closed to grazing in Nalka forest is now stocked with young chir poles and saplings under the mother trees. In kokat forests coppice has come up fairly well, although it must be admitted, that owing to deficient seedling reproduction and proper tending, the proportion of important hardwood species has not materially increased. Owing to intermittent working, bamboo clumps are rather congested.

25. **Past yield.**—Figures of yield prior to 1912 are not available, as the old records were destroyed, when the Divisional Forest Office building was burnt in that year. The produce used by the State, or given to right holders and free grantees has already been mentioned in para 12.

The following statement shows the number of trees and bamboos sold to purchasers from 1912 to 1932:—

Species.	Class I 6'-0" and over.	Class II 4'-6" to 6'-11".	Class III 3'-6" to 4'-6".	Class IV 1'-6" to 2'-11".	Class V under 1'-6"
Chir Harwood	36 ..	187 22	1273 169	3209 710

The total number of bamboos exploited from Bire-ki-dhar forest for sale to purchasers was 1,22,446 or 5831 per annum.

26. Works of improvement undertaken.—

(a) *Sowing and planting.*—Records of sowing and planting done in the past have not been maintained, but it appears that a few desultory and ineffectual attempts were made to introduce chir in Pambu-ki-dhar forest and ban oak in Shamme-ki-dhar with very poor results.

(b) *Roads and buildings.*—A new motor road has been constructed connecting Kasauli with Jagjit Naggar. The existing roads and paths have been kept in repair. The forest staff being local, the forest guards find housing accommodation in the villages or in their homes. The forest Darogha has quarters assigned to him at Jagjit Naggar.

27. Past revenue and expenditure.—The revenue derived from both the demarcated and dehat forests has always been credited together. The following statement shows the total revenue and expenditure, as well as the net surplus for the period 1915-16 to 1932-33 from both classes of forests:

Year.		Revenue. Rs	Expenditure Rs	Surplus Rs
1915-16	...	1551	255	1296
1916-17	...	1898	339	1559
1917-18	...	1519	416	1103
1918-19	...	1490	396	1094
1919-20	...	1682	440	1242
1920-21	...	1601	681	920
1921-22	...	2792	610	2182
1922-23	...	1600	602	998
1923-24	...	2066	546	1520
1924-25	...	2730	542	2188
1925-26	...	4209	601	3608
1926-27	...	2098	630	1468
1927-28	...	1744	602	1142
1928-29	...	1282	612	670
1929-30	...	1190	677	513
1930-31	...	2092	659	1433
1931-32	...	1543	498	1045
1932-33	...	1688	677	1011
Total		34775	9783	24992
Average		1932	543	1389

Grazing affords the largest revenue item.

Chapter VI.
STATISTICS OF GROWTH AND YIELD.

28. **Broad-leaved trees.**—In order to determine the rate of growth of some of the important species and the age at which they attain a size suitable for small timber and firewood, measurements of 400 coppice shoots of known age have been taken and averages worked out. The results thus obtained are as follows:—

Species			Age Year	Average Diameter (inches)	Average height (feet)
<i>Anogeissus latifolia</i>	...	...	8	1'8	10
<i>Anogeissus latifolia</i>	...	...	13	2'6	12
<i>Anogeissus latifolia</i>	...	..	18	2'9	18
<i>Anogeissus latifolia</i>	...	...	28	3'5	22
<i>Grewia oppositifolia</i>	...	...	8	1'8	12
<i>Grewia oppositifolia</i>	...	...	13	2'9	13
<i>Grewia oppositifolia</i>	...	..	18	3'2	17
<i>Grewia oppositifolia</i>	...	...	23	3'9	23
<i>Albizia Odoratissima</i>	...	...	13	2'9	13
<i>Albizia Odoratissima</i>	...	...	23	3'5	30
<i>Odina wodier</i>	...	...	8	1'8	10
<i>Odina wodier</i>	...	...	13	3'2	14
<i>Odina wodier</i>	...	...	23	4'8	20

These figures show that the growth of coppice is very slow and that the 20 years period adopted in the original plan is insufficient for production of suitable size of firewood billets. The felling rotation for coppice will therefore be raised to 30 years and for standards to 60 years.

29. **Outturn of fuel.**—Apart from the rate of growth of the hardwood species, the outturn of firewood per acre has an important bearing on the financial side of working. In order to obtain as correct an idea as possible, experimental fellings over an acre were made by the writer in a 20 year old crop. 20 standards were retained and firewood down to 1 inch diameter was cut and stacked in 5 feet long billets. The outturn thus obtained was 400 c. ft. stacked.

30. **Outturn of bamboos.**—Local data with regard to the outturn of bamboos per acre are not available, but experimental cutting made by the writer on one acre area of average density gave 270 bamboos of mixed quality and sizes, 50 per cent being crooked and useless, so that for forecasting financial results 120 bamboos per acre may be assumed to be a fair yield per acre.

As regards the felling cycle, it is no more a controversial point. Detailed experiments made in some of the Punjab bamboo forests have shown that the maximum production of new shoots, the maximum yield both in numbers, in superior classes and therefore in money yield is obtained under the biennial felling cycle.

Part II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

Chapter I.

BASIS OF PROPOSALS.

31. **Objects of management.**—The objects of management are to preserve and improve the existing forests, protect the hillsides from erosion, satisfy the legitimate rights and requirements of the right holders and the local population, for grazing and forest produce and subject to the objects stated above, to manage and develop the forest resources to the best advantage of the state.

32. **Methods of treatment to be adopted.**—To attain these objects the treatment prescribed for the chir forests is thinnings and improvement fellings on a 10 year cycle, which is twice the period of the previous cycle.

The kokat areas will be treated by a system of coppice with standards supplemented by such operations as may be necessary to increase the proportion of comparatively valuable species such as *Anogeissus latifolia*, *Terminalia tomentosa* and *Acacia catechu*.

The bamboo area will be continued to be worked under a 2 year felling cycle, and felling shall be carried out in accordance with the bamboo felling rules drawn up by the Conservator of Forests, Eastern Circle, for the Eastern Circle, slightly modified for marketing reasons.

33. **Working circles.**—Forest dealt within this scheme are so few in number and so small in size that it is hardly necessary to form any working circles. Depending on the method of treatment, the forests are divided into three areas.

- (i) Chir area.
- (ii) Coppice area.
- (iii) Bamboo area.

34. **Period of the scheme.**—It has already been stated in Part I of this scheme that the chir forests are immature. Some of them are likely to approach marketable size in another 30 years. In the case of kokat areas also, the coppice attains a suitable size for firewood billets in 30 years. So that this scheme is made for a period of 30 years commencing with 1st April, 1934. During this time thinnings and improvement fellings in the chir area will be carried out in 3 cycles of 10 years each and coppice fellings will be conducted once over the whole area. Fellings in the chir area will take place every second year and in the bamboo area during the alternate years, thus affording an even distribution of revenue.

Chapter II.

WORKING SCHEME FOR THE CHIR AREA.

35. **General constitution.**—The chir forests cover an area of 248 acres and are given below. The character of vegetation is described in paragraph 15 (a) and a detailed description of the crop is given in Appendix I.

Name of forest		Area (acres)
Chhanol	...	38
Shili	...	35
Boli katli	...	60
Majha	...	40
Nalka	...	75
		—
Total	...	248

36. **Method of treatment.**—There are at present no mature woods ready for regeneration. The method of treatment for the forests will therefore consist of thinnings and improvement fellings for a provisional period of 30 years, the thinning cycle being fixed at 10 years.

37. **Yield.**—The yield will be regulated by area.

38. **Method of executing the fellings.**—Thinnings will be carried out in accordance with the orders contained in Punjab Forest Leaflets Nos. I and I-A. The following rules are suggested for the guidance of marking officer:—

- (a) In even canopied crops a "C" grade thinning will be made to favour the free development of the most promising stems.
- (b) Old mature and misshapen trees 20" and over in diameter where they occur over established reproduction will be removed.
- (c) In thickets of saplings and young poles clearings shall be done.
- (d) Suppressed trees shall be removed.
- (e) In open chir crops an understorey of broad-leaved trees shall be encouraged.
- (f) Dead trees of all sizes shall be removed wherever available.

Primarily the produce of these fellings shall be utilized locally. Any surplus left over can be sold for export.

39. The schedule of thinnings and improvement fellings is as follows:—

Year	Forest	Area (acres)
1934		
1944	Chhanol	38
1954		
1936		
1946	Nalka	75
1956		
1938		
1948	Shili	35
1958		
1940		
1950	Boli katli	60
1960		
1942		
1952	Majha	40
1962		

Chapter III.
WORKING SCHEME FOR THE COPPICE AREA.

40. **Constitution of the area.**—The following forests constitute the coppice area:—

Name of forest		Area (acres)
Timli-ka-nal	...	33
Pambu-ki-dhar	...	27
Bagi-ki-dhar	...	112
Khadli	...	30
Dagota	...	29
Bire-ki-dhar	...	57
		—
Total	...	288

The character of vegetation is described in paragraph 15 (b) and detailed description of individual forests is given in Appendix I.

Bire-ki-dhar forest which contains a mixed crop of hardwood species and bamboos will be worked both for coppice and bamboos.

41. **Method of treatment.**—These forests will be treated under the system of coppice with standards. The number of standards to be retained will vary to some extent with the condition of the crop as well as their crown development, but they should not be too many to suppress the coppice. The diameter of trees suitable for standards varies from 8 inches to 12 inches, so that 30 to 35 standards per acre will be sufficient. Everything except the reserved standards will be clear felled. Blank areas will be artificially restocked with species such as *Anogeissus latifolia*, *Terminalia tomentosa* and *Acacia catechu*.

42. **Rotation.**—From observations and measurement of some of the coppice shoots, it has been found, that the rate of growth is slow and that although the demand is for firewood and small sized timber, a 20 year rotation for the coppice as originally adopted in the old plan is unduly low and does not yield billets of requisite size. The prescribed rotation for the coppice will therefore be 30 years; while the rotation of standards is fixed at 60 years.

43. **Division into coupes.**—It has been stated above that the rotation for the coppice is raised to 30 years. This has necessitated the reorganisation of the coupes. So that 30 coupes varying in area from 8 acres to 13 acres have now been formed.

44. **Calculation of the yield.**—The yield is prescribed by area. The total area of the forest is 288 acres, which at a rotation of 30 years gives an average annual coupe of $9\frac{1}{2}$ acres.

45. **Method of executing the fellings.**—The following rules are prescribed for executing the fellings:—

- (1) The felling areas have not been laid down on the ground. Each year the area to be felled, shown in the felling table in paragraph 46 will be measured and marked off on the ground by small kacha pillars.
- (2) 30 to 35 healthy and vigorous standards per acre will be retained over the entire area of the coupe. Preference will be given to comparatively more valuable species such as *Anogeissus latifolia*, *Terminalia tomentosa* and *Acacia catechu*. The standards will be as evenly distributed over the coupe as possible and will be marked clearly with a ring of white paint or coaltar, numbered, hammer marked at the base, measured and entered in a register.
- (3) All creepers growing on standards shall be cut.

- (4) The remainder of the crop will be coppiced, stool dressing is unnecessary, but the height of the stools above ground must be 4" to 6".
- (5) The fellings will be made in winter months and the coupe cleared before spring.
- (6) Accurate records of the yield for each coupe will be carefully maintained.

46. **Schedule of fellings.**—The following statement gives the year, the number of the coupe and the area to be felled each year. The density of stocking and the necessity of closing to grazing the area felled over, at least for a period of 10 years, has been kept in view and the fellings so arranged as to inflict as little hardship as possible on the right-holders.

Year of felling.	Name of forest.	Coupe No.	Area (acres)
1934-35	Timli-ka-nal	I	9
1935-36	Timli-ka-nal	II	8
1936-37	Timli-ka-nal	III	8
1937-38	Timli-ka-nal	IV	8
1938-39	Khadli	XX	10
1939-40	Dagota	XXIII	10
1940-41	Bire-ki-dhar	XXVI	13
1941-42	Bire-ki-dhar	XXVII	12
1942-43	Bire-ki-dhar	XXVIII	12
1943-44	Bire-ki-dhar	XXIX	10
1944-45	Bire-ki-dhar	XXX	10
1945-46	Pambu-ki-dhar	V	9
1946-47	Pambu-ki-dhar	VI	9
1947-48	Pambu-ki-dhar	VII	9
1948-49	Khadli	XXI	10
1949-50	Dagota	XXIV	10
1950-51	Bagi-ki-dhar	VIII	9
1951-52	Bagi-ki-dhar	IX	9
1952-53	Bagi-ki-dhar	X	9
1953-54	Bagi-ki-dhar	XI	9
1954-55	Bagi-ki-dhar	XII	9
1955-56	Bagi-ki-dhar	XVIII	9
1956-57	Bagi-ki-dhar	XIX	9
1957-58	Bagi-ki-dhar	XXII	10
1958-59	Dagota	XXV	9
1959-60	Bagi-ki-dhar	XIII	10
1960-61	Bagi-ki-dhar	XIV	10
1961-62	Bagi-ki-dhar	XV	10
1962-63	Bagi-ki-dhar	XVI	10
1963-64	Bagi-ki-dhar	XVII	9

47. **Subsidiary silvicultural operations.**—

- (a) Villagers shall be permitted to remove refuse, which they do willingly as soon as the coupe is cleared.
- (b) *Sowing.*—Seed of timber trees such as khair (*Acacia catechu*), chhal (*Anogeissus latifolia*) and sain (*Terminalia tomentosa*) shall be sown broad cast or in patches at the commencement of rains.
- (c) *Weeding.*—In areas sown with seed, two weedings will be done in the first year, i.e., in July and September and one weeding in the month of August for the two subsequent years.

(d) *Cleaning and thinnings.*—Weeds and climbers interfering with the growth of coppice shoots of the more valuable species will be cut and removed and thinnings carried out once during the rotation, when the felled coupe is 10 years old. Thinnings will reduce the number of coppice shoots to 2 or 3 per stool, the most vigorous and promising shoots being retained.

48. *Grazing and grass cutting.*—Grazing will not be permitted in the areas felled over for a period of at least 10 years, but grass cutting under control may be allowed.

49. *Closures.*—The success of coppice reproduction is entirely dependent on the effective exclusion of grazing for the first 10 years of its life, so that it may grow unhampered, by injuries and attain a size beyond the reach of goats. Bagi-ki-dhar and Bire-ki-dhar forests being free of all rights present no difficulty. The other four forests are burdened with grazing rights. Timli-ka-nal and Pahbu-ki-dhar are close to each other and the right holding villages are the same in both areas. It is therefore considered that out of the two areas one could be closed to grazing at a time without inflicting hardship on the people, much less so as grazing area outside the demarcated forest is fairly extensive. In the case of the other two forests namely Khadli and Dagota, the fellings are so arranged that not more than a third of each will be closed to grazing at a time. It will thus be seen that in drawing up the table of fellings, the convenience of the people, so far as it is commensurate with the proper treatment of the forests has not been ignored. Unless this closure is guaranteed fellings shall not take place.

Chapter IV

WORKING SCHEME FOR THE BAMBOO AREA.

50. *Constitution of the area.*—*Dendrocalamus strictus* is the only species of bamboo and grows mainly in Bire-ki-dhar forest over an area of 57 acres and occurs in intimate mixture with hardwood trees elsewhere. The bamboo area therefore overlaps the coppice area. The condition of the bamboos and the character of vegetation in Bire-ki-dhar forest have been described in paragraph 15 (c) and Appendix I.

51. *Division into compartments.*—The area is too small to be divided into compartments. Indeed the outturn is so small, that unless the whole area is cut at a time purchasers are unwilling to take it up. So that the whole of the bamboo area will be cut in alternate years. This will cause very little fluctuation in forest revenue because the this area is being worked during alternate years.

52. *Calculation of the yield.*—The yield will be by area on a biennial basis when the whole of the bamboo area = 57 acres will be gone over.

53. *Method of executing the fellings.*—

1. Fellings shall take place from October 15th to April 15th.
2. From every large clump bamboos of more than two years age shall be cut immediately above the lowest node, the numbers removed for sale not exceeding twice the number of the current year's shoots (manus).
3. No outside culms shall be cut. The shoots shall be left uniformly distributed throughout the clump. Shoots which have flowered may be cut at any time. A few shoots may be cut with the roots for

making walking sticks or for any other purpose. But only from very congested clumps.

4. Every clump from which bamboos have been cut for sale shall be properly cleaned by the contractor.

54. **The fellings.**—The bamboo fellings will be made over the whole of 57 acres in the following alternate years:

1935-36, 1937-38, 1939-40 and so on.

Chapter V. MISCELLANEOUS REGULATIONS.

55. **Rights.**—A summary of the rights existing in the demarcated forests is given in Appendix II. They must be strictly followed, and permits for trees granted to zamindars and others should be issued and illicit and irregular fellings put a stop to. The satisfaction of right-holders requirements is one of the integral objects of management. Ordinarily trees for building purposes and manufacture of agricultural implements will be given from dehat areas, but where not available, trees marked in the demarcated forests will be given in preference to sale for export. Produce of cleanings will also be allowed to zamindars for fire-wood.

56. **Grazing.**—As already mentioned in paragraph 13,4000 sheep and goats of nomadic gaichis are admitted in dehat areas for winter grazing. This is a necessary evil, as it is the main item of forest revenue and is believed to be indispensable for manuring cultivated lands. But this number should not be exceeded.

57. **Grass cutting.**—Grass from Bagi-ki-dhar and Bire-ki-dhar forests is sold to purchasers when in excess of State requirements. This practice will continue in future.

58. **Roads and buildings.**—No new works are suggested.

59. **Fire protection.**—It is hardly necessary to describe the measures necessary for fire protection. They are given in Punjab Forest Leaflet No. 8 and should be followed. No fire lines are required.

60. **Maintenance of boundaries.**—The boundaries of demarcated forests with a few exceptions are in a satisfactory condition. To ensure their proper maintenance it is prescribed that they should be checked and pillars repaired according to the following programme:

Year.	Name of forests.
1934-35	Chheno, Shili and Boli katli.
1935-36	Nalka and Majha.
1936-37	Timli-ka-nal and Pambu-ki-dhar.
1937-38	Bagi-ki-dhar.
1938-39	Khadli, Dagota and Bire-ki-dhar.

61. **Maps.**—The demarcated forests have been marked on 2"=1 mile scale survey sheets. They have been coloured to show the distribution of forests into working areas and are sufficient for all practical purposes.

62. **Range control maps.**—A copy of the map referred to in the foregoing paragraph will be supplied to the State forester who will maintain it in accordance with the instructions contained in Punjab Forest Leaflet No. 7.

63. **Maintenance of records.**—With the present untrained staff and limited resources of the State, it is not possible to prescribe the collection of any statistical data or the maintenance of elaborate records. For the preparation of the Annual Progress Report, three registers will be kept in the form given in Appendix III to this report. Permits will be issued for trees granted to rightholders or used for State purposes. A forest Journal will also be maintained for recording from time to time the works of improvements such as sowings, plantings, the volume of the stacked firewood removed from coppice coupes, the number of bamboos cut from the bamboo area, etc.

64. **Establishment.**—No change in the Establishment is proposed.

Chapter VI. FINANCIAL FORECAST.

65. The forecast of financial results is as follows:

Revenue.

	Rs.
1. Sale of coppice.	150
2. Sale of bamboos (annual average).	150
3. Sale of grass.	100
4. Grazing dues from gaddis.	500
5. Compensation in forest offences.	100
6. Miscellaneous revenue.	100
Total revenue.	1,100

B—Expenditure.

	Rs.
1. Marking of trees.	5
2. Sowing and planting including fencing.	25
3. Works of improvement.	20
4. Miscellaneous.	10
Total B—Expenditure.	60

C—Establishment.

	Rs.
1. Pay of permanent establishment.	600
2. Miscellaneous.	40
Total C—Expenditure	640
Add B—Expenditure	60
Total B and C—Expenditure	700
Surplus.	400
Total Revenue.	1,100.

Chapter VII.
SUMMARY OF PRESCRIPTIONS AND SUGGESTIONS.

66. A summary of prescriptions is given below:—

Working areas.	Prescriptions.	Paragraph.
Chir.	Schedule of fellings.	39
Coppice.	Schedule of fellings.	46
	Sowing.	47 (b)
	Weeding.	47 (c)
	Cleaning and thinning.	47 (d)
	Grazing and grass cutting.	48
	Closure to grazing.	49
Bamboo.	Bamboo fellings.	54
Miscellaneous regulations.	Maintenance of boundaries.	60
	Maintenance of records.	63

Countersigned.

RANA KRISHEN CHAND,
Rana of Kuthar State.

J. A. MACKEOWN,
Superintendent Hill States Simla.

Appendix I.
DESCRIPTION OF FORESTS.
CHIR WORKING AREA,

Name of forest and area.	Description of forest.	
Chhanol ...	Elevation ...	4000'—4400'.
Area 38 acres	Aspect ...	North-east to south-east.
	Slope ...	Moderate.
	Soil ...	Reddish clay loam, shallow with rock outcrops in places.
	Rock ...	Sandstone.
	Growing stock ...	An open to lightly canopied crop of chir poles to II class trees. Reproduction almost entirely absent due to heavy grazing. Undergrowth dense of <i>Carissa</i> , <i>Emphorbia royleana</i> , <i>Myrsina africana</i> and <i>Pyrus pashia</i> . Northern and southern extremities are covered with scattered chir trees and a dense growth of <i>Carissa</i> and other shrubs.
		There is a little <i>Lantana</i> in the lowest portion.
	Treatment ...	Thinnings and improvement fellings.
Shili ...	Elevation ...	4200'—4700'.
Area 35 acres	Aspect ...	Westerly.
	Slope ...	Moderate to steep.
	Soil and rock ...	As before.
	Growing stock ...	An open to lightly canopied, average III quality forest, interspersed with small blanks and consisting of chir poles to II class trees, the former predominating. Height growth better in sheltered places. Undergrowth of <i>Carissa spinarum</i> and <i>Pyrus pashia</i> .
	Treatment ...	Thinnings and improvement fellings.
Boli katti ...	Elevation ...	4200'—4800'.
Area 60 acres	Aspect	North-east and south-east.
	Slope	Moderate to steep.
	Soil and rock ...	As before.
	Growing stock ...	An open to lightly canopied crop of chir poles to II class trees intermingled in places with scattered I class trees. Height growth better in depressions.

Name of forest and area.	Description of forest.		
			sions and stunted on ridges. Somewhat patchy reproduction of chir exists along the north-eastern slope towards the northern extremity of the forest. Undergrowth of <i>Carissa spinarum</i> , <i>Pyrus pashia</i> and <i>Myrsine africana</i> . Some <i>Euphorbia royleana</i> occupies the south-eastern slopes.
	Treatment	...	Thinnings and improvement fellings.
Nalka ...	Elevation	...	3800'—4600'.
Area 75 acres	Aspect	...	North-east to south-east.
	Slope	...	Slope.
	Soil and rock	...	As before.
	Growing stock	...	A low quality crop of III to I class chir trees, some of which are stunted and badly grown. Dense patches of chir saplings and young poles exist all over the area except in the upper part open to grazing. Large blanks densely overgrown with <i>Euphorbia royleana</i> . <i>Carissa spinarum</i> and <i>Berberis</i> species occupy the lower south-eastern slope. <i>Lantana</i> is invading the lower portion. Broad-leaved species occupy the central nala. Undergrowth of <i>Carissa spinarum</i> , <i>Berberis</i> species and <i>Woodfordia floribunda</i> , etc. is dense in places.
	Treatment	...	Early thinnings and clearings in thickets of young poles and saplings and gradual removal of mature malformed trees overshadowing the young crop.
Majha ...	Elevation	...	2900'—3300'.
Area 40 acres	Aspect	...	All aspects.
	Slope	...	Slope to precipitous.
	Soil	...	Hard reddish clay, thin on ridges, fairly deep in depressions.
	Rock	...	Sandstone and boulders.
	Growing stock	...	A low quality forest of chir poles to II class trees well grown in depression. Crop generally open with a few lightly canopied patches. East of the main ridges and on southern slopes west of it, scattered chir trees with dense covering of <i>Carissa spinarum</i> , <i>Dodonea viscosa</i> , <i>Woodfordia floribunda</i> , <i>Flacourinia ramontchi</i> and <i>Euphorbia royleana</i> . <i>Lantana</i> is spreading in the area east of the main ridge. Some broad-leaved species such as <i>Cedrela toona</i> , <i>Pistacia integerrima</i> , <i>Acacia catechu</i> , <i>Albizia</i> species, <i>Malotus phillipensis</i> , and <i>Pyrus pashia</i> are found in depressions. Reproduction of chir exist in places.
	Treatment	...	Thinnings and improvement fellings.

Name of forest and area	Description of forest.		
Timli-ka-nal...	Elevation	...	3300'—3800'.
Area 33 acres	Aspect	...	South-west and west.
	Slope	...	Fairly steep.
	Soil	...	Shallow and stony clay loam, fairly deep in sheltered places.
	Rock	...	Sandstone.
	Growing stock	...	A two storied forest of the low hill type: <i>chhal</i> being the predominating species. The upper storey consists of standards of <i>chhal</i> , <i>shingar</i> , <i>siris</i> , <i>jhingan</i> , <i>kakkar</i> , <i>karmaru</i> , <i>sain</i> , <i>khair</i> , <i>ambara</i> , <i>kachnar</i> and <i>beul</i> of coppice origin of 2' average girth and 20' average height. <i>Koranda</i> , <i>kango</i> , <i>basuti</i> , <i>dhaa</i> , <i>kuri</i> and <i>kathi</i> form a fairly dense understorey. <i>Thor</i> occurs scattered in small quantities on hot slopes. Reproduction from seed is scarce.
	Treatment	...	To be worked as coppice with standards.
Pambu-ki-dhar	Elevation	...	4200' - 4700'.
Area 27 acres	Aspect	...	South and west.
	Slope	...	Fairly steep.
	Soil and rock	...	As before.
	Growing stock	...	A forest of the same species as above. The upper storey consists mainly of <i>chhal</i> standards, with a few <i>jhingan</i> and <i>shingar</i> varying in girth from 1' to 1'-9" and of mixed seed and coppice origin. The lower storey of brushwood is somewhat open in stocking in the western half of the forest. A grassy blank covered with scattered <i>Chir</i> young poles occurs below boundary pillar No. 2. <i>Taur</i> creeper covers the trees in the western half of the forest.
	Treatment	...	As above. Sowing of <i>khair</i> , <i>sain</i> and <i>chhal</i> in the blank over about 4 acres.
Bagi-ki-dhar...	Elevation	...	2800'—4055'.
Area 112 acres	Aspect	...	South-west and north-west.
	Slope, soil and rock	...	As before.
	Growing stock	...	A forest of the same species as above. The standards vary in girth from 1'-6" to 2' 0" and in height from 25' to 30'. <i>Taur</i> creeper occurs in depressions. The crop is generally open.
	Treatment	...	To be worked as coppice with standards.

Name of forest and area.	Description of forest.		
Khadli	Elevation	...	2400'—3000'.
Area 30 acres	Aspects	...	North-west and west.
	Slope	...	Moderately steep to steep.
	Soil and rock	...	As before.
	Growing stock	...	The upper storey consists of an open crop of the usual species varying in girth from 2' to 4'. The lower storey contains a dense crop of the usual Brushwood species. A little <i>thor</i> occurs on hot aspects. <i>Lantana</i> is invading the area.
	Treatment	...	To be worked as coppice with standard.
Dagots	Elevation	...	3200'—3700'.
Area 29 acres	Aspect	...	South-west.
	Slope	...	Moderate to steep.
	Soil and rock	...	As before.
	Growing stock	...	A forest of the same density and composition as above except that <i>chhal</i> forms the predominating species and <i>hahera</i> and <i>pula</i> also exist. Trees are somewhat stunted and branched. <i>Taur</i> creeper is very dense in depressions.
	Treatment	...	As before.
Bire-ki-dhar...	Elevation	...	2700'—3300'.
Area 57 acres	Aspect	...	East, south and west.
	Slope	...	Steep.
	Soil	...	Reddish clay loam strewn with boulders.
	Rock	...	Limestone with some sandstone in the lower part.
	Growing stock	...	A mixed forest of the usual broad leaved special and bamboos, the proportion of the former increasing towards the east of the ridge. Bamboos generally occupy the depressions and the lower portion of the forest. Reproduction of bamboos from seed does exist to some extent, but that of broad-leaved species is deficient. <i>Lantana</i> occurs in places in impenetrable masses. <i>Taur</i> creeper completely envelopes some of the bamboo clumps and standards.
	Treatment	...	Bamboo cuttings on a two year cycle. Broad-leaved species to be worked as coppice with standards.

Appendix II.
ABSTRACT OF THE RECORD OF RIGHTS.

Name of forest	Name of Right-holding villages	Rights recorded viz:-
Chhanol	Chhanol	All Rights, viz:- (1) Timber for house building. (2) Timber for agricultural implements (3) Poles for charcoal. (4) Dry wood for fuel. (5) Grazing. (6) Grass cutting. (7) Dead leaves for litter.
	Khadret Badiar	... Nos. 4, 5 and 7.
Shill	Khadret Badiar Bagi	... All Rights.
	Gangari upper Gangari lower	... Nos. 4, 5, 6 and 7.
Boli katli	Tamlog Kati ⁱ Bagi Chilma Patta Chamiekhli Shamme-ki-dher Jansa	... All Rights.
	Kubar	... Nos. 1, 2, 4 and 5.
	Bado upper Bado lower	... All except No. 6.
Nalka	Kumarji Balauri Basoli Durbar Villages surrounding the Durbar Kurban Thana Jatwa Dhundri Chiaon-ka-hara Bado (upper and lower) Ranipur Chiala Rabi	... All Rights.
	Nehri Hanech	... All except No. 3.
	Kharsta Kulhari	... All except No. 6.
Majha	Chiala Kattal Rampur Chamar-ka-hara Gharsta Manlu Chaglisti Dhatri Kufr with Kupali Bindi Kotla Kurham	... All rights.

Name of forest	Name of Right-holding villages	Rights recorded
Timli-ki-nal	Kotia Ruggi Bhagri Dhamres Hara Shamloh Bastla (both) Bori-ka-khet Shashai Mandhog Shil	... All rights.
Pambu-ki-dhar	As for Timli-ki-nal	As for Timli-ki-nal.
Khadli	Khadli Shaughela (both) Thapai Matkuda Tal	... All rights.
Dagota	Kathla Dhar Dhaula Dagota Kamli	... All rights.

Appendix III

REGISTER No. 1.

Trees given to zamindars during the year 1858.

REGISTER No. II.

Trees felled for State use during the year.....

REGISTER No. III.

Trees sold during the year.....

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